SEQUENCE LISTING

<110> Barany, Francis
Cao, Weiguo
Huang, Jianmin
Lu, Jing

<120> DETECTION OF NUCLEIC ACID DIFFERENCES USING COMBINED ENDONUCLEASE CLEAVAGE AND LIGATION REACTIONS

<130> 19603/3331

<140> 09/998,481
<141> 2001-11-30

<150> 60/250,435
<151> 2000-12-01

<160> 50

<170> PatentIn Ver. 2.1

<210> 1
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<213> Thermotoga maritima

<220>
<221> misc_feature
<222> (26)
<223> N at position 26 is inosine

<400> 1
tacccagcg tctgcggtgt tgcgtnagtt gtcatagttt gatcctctag tcttgttgcg 60
ggttcc 66

<210> 2
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<213> Thermatoga maritima

<220>
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<222> (24)
<223> N at position 24 is inosine

<400> 2

ggggtcgcag acgccacaac gcantcaaca gtatcaaact aggagatcag aacaacgccc 60

<210> 3
<211> 34
<212> DNA
<213> Artificial Seguence

<220>
<223> Description of Artificial Sequence: Primer

<400> 3
ggagggaatc atatggatta caggcagctt caca 34

<210> 4
<211> 43
<212> DNA
<213> Artificial Sequence

<220>
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<400> 4
gcgcctggat ccactagttc agaaaaggcc ttttttgagc cgt 43

<210> 5
<211> 66
<212> DNA
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<220>
<223> Description of Artificial Seguence: Synthetic substrate

<220>
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<222> (26)
<223> N at position 26 can be a, t, c, or g

<400> 5
taccccagcg tctgcggtgt tgcgtnagtt gtcatagttt gatcctctag tcttgttgcg 60
ggttcc 66

<210> 6
<211> 60

<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic substrate

<220>
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<222> (24)
<223> N at position 24 can be a, t, c, or g

<400> 6
ggggtcgcag acgccacaac gcantcaaca gtatcaaact aggagatcag aacaacgccc 60

<210> 7
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 7
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<210> 8
<211> 34
<212> DNA
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<220>
<223> Description of Artificial Sequence: Primer

<400> 8
ccccaaaatg gtcagagaaa cctttatctg tatc 34

<210> 9
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 9
ccccgctgcc acttgcaaag tttcttc 27

<210> 10
<211> 25
<212> DNA
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<220>
<223> Description of Artificial Sequence: Primer

<400> 10
ccccactctg aacggagctg gcaat 25

<210> 11
<211> 27
<212> DNA
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<220>
<223> Description of Artificial Sequence: Primer

<400> 11
cccctgttca cttgtgccct gactttc 27

<210> 12
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 12
cccccagctg ctcaccatcg ctatc 25

<210> 13
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 13
cccccctctga ttcctcactg attgctctta 30

<210> 14
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 14
cccggccact gacaaccacc cttaac 26

<210> 15
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
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<400> 15
cccgcctcat cttgggcctg tgttatc 27

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<211> 30
<212> DNA
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<220>
<223> Description of Artificial Sequence: Primer

<400> 16
cccgtggatg ggtagtagta tggaagaaat 30

<210> 17
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 17
cccggacagg taggacctga tttccttac 29

<210> 18
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 18
ccccgcttct tgtcctgctt gcttac 26

<210> 19
<211> 27
<212> DNA
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<220>
<223> Description of Artificial Sequence: Primer

<400> 19
cccgcatggt ggtgcacacc tatagtc 27

<210> 20
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 20
cccaagctgt tccgtcccag tagattac 28

<210> 21
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 21
cccctcattg gaacagaaag aaatggattt atc 33

<210> 22
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 22
cccctcttcc ctagtatgta aggtcaattc tgttc 35

<210> 23
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 23
ccccacttcc attgaaggaa gcttctcttt c 31

<210> 24
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 24
ccccatctct gcaaagggga gtggaatac 29

<210> 25
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 25
cccccaaaat atgtctggat tggagaaagt ttc 33

<210> 26
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<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 26
cccttggaa aagacttgct tggtactatc ttc 33

<210> 27
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 27
cccgaccgcg cgcgaagact ac 22

<210> 28
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 28
cccaggggct tcagaccgtg ctatc 25

<210> 29
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 29
ccccaccggt gtggctcttt aacaac 26

<210> 30
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 30
cccctgacat caggcaaaaa ttgagaa 27

<210> 31
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 31
ccctagttgt tggcaaagcc tcttgttc 28

<210> 32
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 32
cccaaactaa ggaaggaacc agtcctgtat c 31

<210> 33
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 33
ccccatagtg tattaacctt atgtgtgaca tgttc 35

<210> 34
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 34
ccccaaaatg gtcagagaaa cctttatctg tatc 34

<210> 35
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 35
ccccgctgcc acttgcaaag tttcttc 27

<210> 36
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 36
ccccactctg aacggagctg gcaat 25

<210> 37
<211> 225
<212> PRT
<213> Thermotoga maritima

<400> 37
Met Asp Tyr Arg Gln Leu His Arg Trp Asp Leu Pro Pro Asp Glu Ala
1 5 10 15

Ile Lys Val Gln Asn Glu Leu Arg Lys Lys Ile Lys Leu Thr Pro Tyr
20 25 30

Glu Gly Glu Pro Glu Tyr Val Ala Gly Val Asp Leu Ser Phe Pro Gly
35 40 45

Lys Glu Glu Gly Leu Ala Val Ile Val Val Leu Glu Tyr Pro Ser Phe
50 55 60

Lys Ile Leu Glu Val Val Ser Glu Arg Gly Glu Ile Thr Phe Pro Tyr
65 70 75 80

Ile Pro Gly Leu Leu Ala Phe Arg Glu Gly Pro Leu Phe Leu Lys Ala
85 90 95

Trp Glu Lys Leu Arg Thr Lys Pro Asp Val Val Val Phe Asp Gly Gln
100 105 110

Gly Leu Ala His Pro Arg Lys Leu Gly Ile Ala Ser His Met Gly Leu
115 120 125

Phe Ile Glu Ile Pro Thr Ile Gly Val Ala Lys Ser Arg Leu Tyr Gly
130 135 140

Thr Phe Lys Met Pro Glu Asp Lys Arg Cys Ser Trp Ser Tyr Leu Tyr
145 150 155 160

Asp Gly Glu Glu Ile Ile Gly Cys Val Ile Arg Thr Lys Glu Gly Ser
165 170 175

Ala Pro Ile Phe Val Ser Pro Gly His Leu Met Asp Val Glu Ser Ser
180 185 190

Lys Arg Leu Ile Lys Ala Phe Thr Leu Pro Gly Arg Arg Ile Pro Glu
195 200 205

Pro Thr Arg Leu Ala His Ile Tyr Thr Gln Arg Leu Lys Lys Gly Leu
210 215 220

Phe
225

<210> 38
<211> 229
<212> PRT
<213> Pyrobaculum aerophilum

<400> 38

Met Ala Arg Leu Lys Leu Leu Lys Lys Phe Ser Pro Arg Leu Met Pro
1 5 10 15

Pro Ile Asn Ile Glu Ala Ala Arg Arg Ile Gln Glu Arg Leu Ala Arg
20 25 30

Gln Val Thr Tyr Ala Pro Leu Pro Pro Val Glu Thr Val Ala Gly Leu
35 40 45

Asp Val Ala Tyr Ser Gly Ser Leu Ala Phe Gly Ala Ala Val Val Val
50 55 60

Lys Arg Thr Thr Leu Glu Val Val Glu Thr Ala Cys Ser Val Ser Arg
65 70 75 80

Ile Val Val Pro Tyr Val Pro Thr Phe Leu Ala Phe Arg Glu Leu Thr
85 90 95

Pro Met Leu Arg Ala Tyr Ile Lys Leu Lys Ser Lys Pro Asp Val Ile
100 105 110

Leu Val Asp Gly His Gly Val Ala His Pro Arg Arg Phe Gly Ile Ala
115 120 125

Ser His Ile Gly Val Val Leu Lys Lys Pro Thr Ile Gly Val Ala Lys
130 135 140

Ser Arg Leu Tyr Gly Glu Glu Val Gly Asp Lys Leu Val Asp Pro Ala
145 150 155 160

Thr Gly Glu Val Leu Ala Leu Ile Ile Lys Cys Gly Gly Lys Lys Tyr
165 170 175

Val Ser Val Gly Ser Tyr Ala Thr Leu Asp Glu Ala Ala Gly Leu Val
180 185 190

Ala Gln Leu Cys Lys Ser Gly Asp Val Tyr Pro Leu Arg Leu Ala His
195 200 205

Glu Leu Ala Asn Lys Leu Lys Lys Ala His Leu Pro Asp Asp Lys Asp
210 215 220

Arg Asp Ser Cys Pro
225

<210> 39
<211> 211
<212> PRT
<213> Pyrococcus horikoshii

<400> 39

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Met Leu Glu Arg Ile Ala Asn Ile Gln Lys Lys Leu Ser Lys Ser Ile
 1               5                  10                  15

Val Glu Arg Lys Ile Asn Glu Val Arg Lys Val Ala Ala Val Asp Val
            20                  25                  30

Ser Tyr Lys Glu Glu Lys Ala Arg Ala Ala Leu Val Ile Thr Thr Phe
        35                  40                  45

Pro Glu Gly Glu Val Leu Lys Thr Lys Val Ile Glu Thr Thr Val Ser
    50                  55                  60

Phe Pro Tyr Ile Pro Thr Phe Phe Phe Leu Arg Glu Thr Lys Pro Ile
65                  70                  75                  80

Leu Ile Ala Thr Lys Gly Glu Thr Phe Asp Val Leu Ile Val Glu Gly
                85                  90                  95

His Gly Lys Ala His Pro Arg Gly Tyr Gly Leu Ala Ser His Ile Gly
            100                 105                 110

Val Val Leu Arg Lys Pro Thr Ile Gly Val Ala Lys Arg Leu Leu Lys
        115                 120                 125

Asn Thr Pro Lys Asp Thr Tyr Lys Lys Val Gly Lys Val Tyr Val Ser
    130                 135                 140

Val Gly Asn Leu Ile Thr Leu Glu Asp Ala Thr Lys Ile Ile Arg Ala
145                 150                 155                 160

Ile Leu Asp Glu Ser Gly Tyr Pro Lys Pro Leu Lys Leu Ala Asp Lys
                165                 170                 175

Leu Ser Lys Gly Arg Ile Tyr Glu Val Lys Asn Thr Pro Ser Pro Asn
            180                 185                 190

Arg Ser Arg Lys Lys Arg Gly Asn Arg Gly Lys Asp Asn Asn Asn Ser
        195                 200                 205

Gln Gly Asn
    210
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<210> 40
<211> 194
<212> PRT
<213> Pyrococcus abyssi

<400> 40
Met Leu Glu Lys Ile Ala Glu Val Gln Lys Lys Leu Ser Lys Arg Ile
1 5 10 15

Val Glu Lys Glu Val Arg Met Val Ser Lys Ile Ala Ala Val Asp Val
20 25 30

Ser Tyr Lys Gly Asn Lys Ala Arg Val Ala Leu Val Ile Cys Ser Phe
35 40 45

Pro Asp Cys Lys Val Leu Lys Thr Lys Val Leu Glu Thr Glu Val Ser
50 55 60

Phe Pro Tyr Ile Pro Thr Phe Phe Phe Leu Arg Glu Thr Arg Pro Ile
65 70 75 80

Leu Leu Val Thr Lys Gly Glu Glu Phe Asp Val Leu Ile Val Glu Gly
85 90 95

His Gly Lys Ala His Pro Arg Lys Tyr Gly Leu Ala Ser His Ile Gly
100 105 110

Leu Ile Leu Gly Lys Pro Thr Ile Gly Val Ala Lys Lys Leu Leu Arg
115 120 125

Gly Thr Pro Glu Asn Ser Tyr Arg Lys Val Gly Lys Ala Tyr Val Ser
130 135 140

Val Gly Asn Met Ile Thr Leu Lys Asp Ala Val Arg Ile Ile Glu Lys
145 150 155 160

Leu Leu Asp Gly Gly Tyr Pro Lys Pro Leu Lys Leu Ala Asp Lys Leu
165 170 175

Ser Lys Gly Lys Ile Ser Glu Asp Glu Asn Thr Leu Pro Ser Asp Lys
180 185 190

Thr Ser

<210> 41

<211> 182
<212> PRT
<213> Pyrococcus furiosus

<400> 41
Met Ile Asp Leu Arg Lys Leu Thr Glu Val Gln Arg Arg Leu Ser Arg
1 5 10 15

Lys Ile Val Glu Lys Pro Ile Asp Ile Ala Lys Val Lys Arg Val Gly
20 25 30

Ala Val Asp Val Ser Tyr Lys Asn Asn Phe Ala Lys Ala Ala Phe Val
35 40 45

Cys Val Glu Phe Pro Ser Gly Glu Ile Ile Lys Thr Lys Thr Ile Val
50 55 60

Thr Thr Val Glu Phe Pro Tyr Ile Pro Thr Phe Phe Phe Leu Arg Glu
65 70 75 80

Thr Lys Pro Ile Leu Leu Ala Val Lys Asp Glu Asn Phe Asp Val Leu
85 90 95

Leu Val Glu Gly His Gly Lys Ala His Pro Arg Arg Tyr Gly Leu Ala
100 105 110

Ser His Ile Gly Val Ile Leu Ser Lys Pro Thr Ile Gly Val Ala Lys
115 120 125

Arg Leu Leu Arg Gly Val Ser Lys Asp Thr Tyr Val Lys Val Gly Lys
130 135 140

Ala Phe Val Ser Val Gly Asn Leu Ile Thr Leu Asn Asp Ala Val Arg
145 150 155 160

Ile Val Glu Lys Leu Leu Asp Glu Asn Gly Tyr Pro Lys Pro Leu Asn
165 170 175

Ile Ala Asp Lys Leu Ser
180

<210> 42
<211> 221
<212> PRT
<213> Archaeoglobus fulgidus

<400> 42

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Met Leu Gln Met Asn Leu Glu Glu Leu Arg Arg Ile Gln Glu Glu Met
 1               5                  10                  15

Ser Arg Ser Val Val Leu Glu Asp Leu Ile Pro Leu Glu Glu Leu Glu
            20                  25                  30

Tyr Val Val Gly Val Asp Gln Ala Phe Ile Ser Asp Glu Val Val Ser
        35                  40                  45

Cys Ala Val Lys Leu Thr Phe Pro Glu Leu Glu Val Val Asp Lys Ala
    50                  55                  60

Val Arg Val Glu Lys Val Thr Phe Pro Tyr Ile Pro Thr Phe Leu Met
65                  70                  75                  80

Phe Arg Glu Gly Glu Pro Ala Val Asn Ala Val Lys Gly Leu Val Asp
                85                  90                  95

Asp Arg Ala Ala Ile Met Val Asp Gly Ser Gly Ile Ala His Pro Arg
            100                 105                 110

Arg Cys Gly Leu Ala Thr Tyr Ile Ala Leu Lys Leu Arg Lys Pro Thr
        115                 120                 125

Val Gly Ile Thr Lys Lys Arg Leu Phe Gly Glu Met Val Glu Val Glu
    130                 135                 140

Asp Gly Leu Trp Arg Leu Leu Asp Gly Ser Glu Thr Ile Gly Tyr Ala
145                 150                 155                 160

Leu Lys Ser Cys Arg Arg Cys Lys Pro Ile Phe Ile Ser Pro Gly Ser
                165                 170                 175

Tyr Ile Ser Pro Asp Ser Ala Leu Glu Leu Thr Arg Lys Cys Leu Lys
            180                 185                 190

Gly Tyr Lys Leu Pro Glu Pro Ile Arg Ile Ala Asp Lys Leu Thr Lys
        195                 200                 205

Glu Val Lys Arg Glu Leu Thr Pro Thr Ser Lys Leu Lys
    210                 215                 220
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<210> 43
<211> 218
<212> PRT
<213> Aeropyrum pernix

<400> 43

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Met Leu Gly Leu Asp Ala Ser Tyr Ser Ala Lys Asp Gly Val Gly Val
 1               5                  10                  15

Gly Ala Ala Val Leu Ile Ser Leu Glu Thr Leu Glu Pro Val Asp Cys
            20                  25                  30

Arg Val Tyr Ile Ser Arg Val Cys Ile Pro Tyr Ile Pro Gly Leu Leu
        35                  40                  45

Ala Phe Arg Glu Leu Ala Val Met Ala Pro Ala Ala Ala Ala Leu Ser
    50                  55                  60

Ala Glu Ala Asp Val Val Met Val Asp Gly His Gly Ile Ala His Pro
65                  70                  75                  80

Arg Arg Phe Gly Ile Ala Ser His Val Gly Val Ile Leu Glu Arg Pro
                85                  90                  95

Ser Ile Gly Val Ala Lys Lys Lys Leu Val Gly Thr Leu Val Glu Gly
            100                 105                 110

Pro Gly Gly Met Tyr Val Val Gln Asp Gly Glu Arg Leu Ala Ile Val
        115                 120                 125

Leu Gly Thr Arg Pro Arg Glu Val Tyr Val Ser Pro Gly His Arg Ile
    130                 135                 140

Thr Leu Glu Glu Ala Ala Ser Ile Ala Arg Ala Thr Ile Arg Pro Gly
145                 150                 155                 160

Gly Trp Met Pro Glu Pro Thr Arg Leu Ala Asp Val Ile Ser Lys Ala
                165                 170                 175

Leu Lys Thr Ile Ile Gly Gly Gln Ser Leu Ile Asn Ser Ala Leu Ala
            180                 185                 190

Ser Leu Cys Arg Val Lys Leu Gly Pro Arg Leu Glu Glu Leu Glu Arg
        195                 200                 205

Pro Leu Arg Arg Ala Gly Leu Glu Val Glu
    210                 215
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<210> 44
<211> 219
<212> PRT
<213> Clostridium acetobutylicum

<400> 44

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Ala Ser Ser Lys Glu Glu Phe Gln Val Ile Gln Ser Ser Leu Val Lys
 1               5                  10                  15

Arg Ile Lys Leu Ile Ser Asp Phe Lys Glu Glu Asp Ile Lys Leu Cys
            20                  25                  30

Ala Gly Val Asp Leu Ala Tyr Trp Thr Lys Gly Glu Lys Gln Tyr Gly
        35                  40                  45

Val Cys Cys Ile Ile Val Ile Asp Tyr Asn Thr Gly Glu Ile Ile Glu
    50                  55                  60

Lys Ala Tyr Asp Tyr Gly Glu Ile Glu Val Pro Tyr Met Pro Gly Phe
65                  70                  75                  80

Leu Ala Phe Arg Glu Leu Pro Leu Val Ile Lys Thr Val Lys Lys Leu
                85                  90                  95

Lys Asn Glu Pro Asp Ile Phe Met Phe Asp Gly Asn Gly Tyr Leu His
            100                 105                 110

Tyr Asn His Met Gly Ile Ala Thr His Ala Ser Phe Phe Leu Asn Lys
        115                 120                 125

Pro Thr Ile Gly Val Ala Lys Ser Tyr Leu Lys Val Ala Gly Val Asp
    130                 135                 140

Phe Glu Met Pro Glu Ser Phe Glu Gly Ala Phe Lys Asp Ile Val Ile
145                 150                 155                 160

Asn Glu Glu Val Tyr Gly Arg Val Leu Arg Thr Lys Lys Asp Val Lys
                165                 170                 175

Pro Ile Phe Val Ser Cys Gly Asn Tyr Ile Asp Leu Glu Thr Cys Thr
            180                 185                 190

Lys Ile Cys Ser Lys Leu Ile Asn Asn Asp Ser Arg Leu Pro Ile Thr
        195                 200                 205

Val Arg Leu Ala Asp Leu Glu Thr His Lys Arg
    210                 215
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<210> 45
<211> 224
<212> PRT

<213> Yersinia pestis

<400> 45

Val Phe Asp Thr Lys Ala Leu Gln Ala Glu Gln Arg Gln Arg Ala Ser
1 5 10 15

Glu Ile Ser Leu His Asp Gly Ile Asp Asn Gln Ser Val Arg Phe Ile
20 25 30

Ala Gly Ala Asp Val Gly Phe Glu Gln His Gly Glu Ile Thr Arg Ala
35 40 45

Ala Ile Ala Ile Leu Arg Tyr Pro Ser Leu Ala Leu Val Glu Tyr Gln
50 55 60

Val Ala Arg Val Ala Thr Ser Leu Pro Tyr Ile Pro Gly Leu Leu Ser
65 70 75 80

Phe Arg Glu Tyr Pro Ala Leu Leu Ala Ala Trp Ala Gln Leu Gln Gln
85 90 95

Arg Pro Asp Leu Ile Leu Val Asp Gly Gln Gly Ile Ala His Pro Arg
100 105 110

Arg Leu Gly Val Ala Ser His Phe Gly Leu Leu Val Asp Val Pro Thr
115 120 125

Ile Gly Val Ala Lys Ser Arg Leu Cys Gly Asp Phe Leu Pro Leu His
130 135 140

Gln Asp Val Gly Ala Val Gln Pro Leu Phe Asp Asn Asp Glu Gln Leu
145 150 155 160

Gly Trp Val Trp Arg Ser Lys Ile Arg Cys Asn Pro Leu Phe Ile Ser
165 170 175

Pro Gly His Arg Val Ser Val Gly Ser Ala Leu Ala Trp Val Gln Arg
180 185 190

Cys Met Ala Gly Tyr Arg Leu Pro Glu Pro Thr Arg Trp Ala Asp Ala
195 200 205

Ile Ala Ser Asn Arg Pro Gln Phe Gln Arg Trp Leu Arg Lys Asn Pro
210 215 220

<210> 46
<211> 225
<212> PRT
<213> Escherichia coli

<400> 46

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Met Ile Met Asp Leu Ala Ser Leu Arg Ala Gln Gln Ile Glu Leu Ala
 1               5                  10                  15

Ser Ser Val Ile Arg Glu Asp Arg Leu Asp Lys Asp Pro Pro Asp Leu
            20                  25                  30

Ile Ala Gly Ala Asp Val Gly Phe Glu Gln Gly Gly Glu Val Thr Arg
        35                  40                  45

Ala Ala Met Val Leu Leu Lys Tyr Pro Ser Leu Glu Leu Val Glu Tyr
    50                  55                  60

Lys Val Ala Arg Ile Ala Thr Thr Met Pro Tyr Ile Pro Gly Phe Leu
65                  70                  75                  80

Ser Phe Arg Glu Tyr Pro Ala Leu Leu Ala Ala Trp Glu Met Leu Ser
                85                  90                  95

Gln Lys Pro Asp Leu Val Phe Val Asp Gly His Gly Ile Ser His Pro
            100                 105                 110

Arg Arg Leu Gly Val Ala Ser His Phe Gly Leu Leu Val Asp Val Pro
        115                 120                 125

Thr Ile Gly Val Ala Lys Lys Arg Leu Cys Gly Lys Phe Glu Pro Leu
    130                 135                 140

Ser Ser Glu Pro Gly Ala Leu Ala Pro Leu Met Asp Lys Gly Glu Gln
145                 150                 155                 160

Leu Ala Trp Val Trp Arg Ser Lys Ala Arg Cys Asn Pro Leu Phe Ile
                165                 170                 175

Ala Thr Gly His Arg Val Ser Val Asp Ser Ala Leu Ala Trp Val Gln
            180                 185                 190

Arg Cys Met Lys Gly Tyr Arg Leu Pro Glu Pro Thr Arg Trp Ala Asp
        195                 200                 205

Ala Val Ala Ser Glu Arg Pro Ala Phe Val Arg Tyr Thr Ala Asn Gln
    210                 215                 220
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Pro
225

<210> 47
<211> 238
<212> PRT
<213> Bacillus subtilis

<400> 47
Met Lys Val Phe Asp Val His Lys Phe Asp Met Lys Lys Glu Gln Asp
1 5 10 15

Phe Leu Gln Val Gln Phe Asn Leu Lys Asn Arg Ile Asn Leu Ser Pro
20 25 30

Thr Ile His Pro Asp Ser Ile Asn Thr Gly Ala Gly Val Asp Leu Ala
35 40 45

Tyr Trp Glu Gln Asp Gly Glu Pro Tyr Gly Val Cys Cys Ile Ile Val
50 55 60

Ile Asp Ala Asp Thr Lys Glu Val Ile Glu Lys Val His Ser Met Gly
65 70 75 80

Arg Ile Ser Val Pro Tyr Val Ser Gly Phe Leu Ala Phe Arg Glu Leu
85 90 95

Pro Leu Ile Ile Glu Ala Ala Lys Lys Leu Glu Thr Glu Pro Asp Val
100 105 110

Phe Leu Phe Asp Gly Asn Gly Tyr Leu His Tyr Asn His Met Gly Val
115 120 125

Ala Thr His Ala Ala Phe Phe Leu Gly Lys Pro Thr Ile Gly Ile Ala
130 135 140

Lys Thr Tyr Leu Lys Ile Lys Gly Cys Asp Phe Val Thr Pro Glu Ile
145 150 155 160

Glu Val Gly Ala Tyr Thr Asp Ile Ile Ile Asp Gly Glu Val Tyr Gly
165 170 175

Arg Ala Leu Arg Thr Arg Arg Asp Val Lys Pro Ile Phe Leu Ser Cys
180 185 190

Gly Asn Tyr Ile Asp Leu Asp Ser Ser Tyr Gln Ile Thr Met Ser Leu

195 200 205

Ile Asn Gln Glu Ser Arg Leu Pro Ile Pro Val Arg Leu Ala Asp Leu
210 215 220

Glu Thr His Val Leu Arg Thr Phe Tyr Gln Lys Asn His Val
225 230 235

<210> 48
<211> 223
<212> PRT
<213> Salmonella typhimurium

<400> 48
Met Asp Leu Ala Ser Leu Arg Ala Gln Gln Ile Glu Leu Ala Ser Ser
1 5 10 15

Val Cys Arg Glu Asp Arg Leu Asp Lys Asp Pro Pro Ala Phe Ile Gly
20 25 30

Gly Ala Asp Val Gly Phe Glu Gln Gly Gly Glu Val Thr Arg Ala Ala
35 40 45

Met Val Leu Leu Lys Tyr Pro Ser Leu Glu Leu Val Glu Tyr Lys Val
50 55 60

Ala Arg Ile Ala Thr Thr Met Pro Tyr Ile Pro Gly Phe Leu Ser Phe
65 70 75 80

Arg Glu Tyr Pro Ala Leu Leu Ala Ala Trp Glu Gln Leu Ser Gln Lys
85 90 95

Pro Asp Leu Leu Phe Val Asp Gly His Gly Ile Ser His Pro Arg Arg
100 105 110

Leu Gly Val Ala Ser His Phe Gly Leu Leu Val Asp Val Pro Thr Ile
115 120 125

Gly Val Ala Lys Lys Arg Leu Cys Gly Lys Phe Glu Pro Leu Ser Ala
130 135 140

Glu Pro Gly Ala Leu Ser Pro Leu Met Asp Lys Gly Glu Gln Leu Ala
145 150 155 160

Trp Val Trp Arg Ser Lys Ala Arg Cys Asn Pro Leu Phe Ile Ala Thr
165 170 175

Gly His Arg Val Ser Thr Asp Ser Ala Leu Ala Trp Val Gln Arg Cys
180 185 190

Met Lys Gly Tyr Arg Leu Pro Glu Pro Thr Arg Trp Ala Asp Ala Val
195 200 205

Ala Ser Gly Arg Pro Ala Phe Val Arg Trp Gln Glu Ile Gln Arg
210 215 220

<210> 49
<211> 233
<212> PRT
<213> Streptomyces coelicolor

<400> 49
Met Thr Thr Val Ser Val Gln Ile Pro Ala Gly Trp Pro Ala Thr Glu
1 5 10 15

Glu Arg Ala Arg Ala Val Gln Asp Glu Leu Arg Ala Arg Val Val Leu
20 25 30

Asp Glu Pro Gly Pro Pro Pro Gly Thr Gly Arg Val Thr Gly Val Asp
35 40 45

Val Ala Tyr Asp Asp Glu Arg Asp Val Val Ala Ala Ala Ala Val Val
50 55 60

Leu Asp Ala Gly Thr Leu Ala Val Val Ala Glu Ala Thr Ala Val Gly
65 70 75 80

Arg Ile Ser Phe Pro Tyr Val Pro Gly Leu Leu Ala Phe Arg Glu Ile
85 90 95

Pro Thr Val Leu Ala Ala Leu Glu Ala Leu Pro Cys Pro Pro Gly Leu
100 105 110

Val Val Cys Asp Gly Tyr Gly Leu Ala His Pro Arg Arg Phe Gly Leu
115 120 125

Ala Ser His Leu Gly Val Leu Thr Gly Leu Pro Thr Ile Gly Val Ala
130 135 140

Lys Asn Pro Phe Thr Phe Thr His Asp Asp Pro Asp Thr Pro Arg Gly
145 150 155 160

Ser Thr Ser Pro Leu Leu Ala Gly Ala Glu Glu Val Gly Arg Ala Val
165 170 175

Arg Thr Arg Asp Gly Val Lys Pro Val Phe Val Ser Val Gly His Arg
180 185 190

Val Gly Leu Gly Asn Ala Cys Ala His Thr Leu Ala Leu Thr Pro Ala
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Tyr Arg Leu Pro Glu Thr Thr Arg Arg Ala Asp Ala Leu Cys Arg Ala
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Ala Leu Arg Asp Ala Ala Tyr Arg Ala
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Ile Val Leu Glu Asp Ile Val Asp Glu Val Glu Leu Val Ala Gly Val
20 25 30

Asp Val Ala Tyr Gly Gly Glu Val Gly Arg Ala Ala Ala Val Val Leu
35 40 45

Asp Tyr Pro Ser Leu Glu Val Val Glu Thr Lys Val Ala Val Gly Arg
50 55 60

Val Ser Phe Pro Tyr Ile Pro Gly Phe Leu Ala Phe Arg Glu Leu Pro
65 70 75 80

Pro Ile Leu Ala Ala Trp Lys Lys Leu Ser Glu Glu Pro Asp Val Val
85 90 95

Leu Val Asp Gly His Gly Ile Ala His Pro Arg Arg Leu Gly Leu Ala
100 105 110

Ser His Ile Gly Leu Leu Leu Gly Lys Pro Thr Ile Gly Val Ala Lys
115 120 125

Ser Arg Leu Cys Gly Thr Phe Leu Glu Asp Gly Ala Pro Leu Leu Asp
130 135 140

Gly Gly Glu Gln Leu Gly Tyr Val Leu Arg Thr Lys Arg Cys Lys Pro
145 150 155 160

Ile Phe Val Ser Val Gly His Arg Ile Thr Leu Asp Ser Ala Leu Ala
165 170 175

Ile Val Gln Ala Leu Leu Asp Gly Tyr Arg Leu Pro Glu Pro Thr Arg
180 185 190

Leu Ala Asp Ala Leu Ala Lys Arg Arg Lys Ala
195 200